ELSEVIER

Enhancing Informed Consent for Research and Treatment

Laura B. Dunn, M.D., and Dilip V. Jeste, M.D.

Increased scrutiny of informed consent calls for further research into decision making by patients who may be at risk for impairments. We review interventions designed to improve patient understanding of informed consent. A number of studies, within as well as outside psychiatry, have evaluated the effectiveness of specific interventions, as well as possible "predictors" of understanding of consent, such as subject characteristics, psychiatric symptoms, and cognitive impairment. Deficits in patients' understanding of informed consent may be partially related to poorly conceived, written, or organized informed consent materials; these deficits may be remediable with educational interventions. We find that effective interventions include corrected feedback, multiple learning trials, and more organized or simplified consent forms. Educational levels of patients generally correlate with levels of understanding. Even among individuals with psychiatric illness or cognitive impairment, deficits in understanding can be remedied with certain educational interventions. A variety of interventions can enhance understanding of informed consent.

[Neuropsychopharmacology 24:595–607, 2001]

KEY WORDS: *Bioethics; Schizophrenia; Competency; Decision making; Psychiatric disorders*

The right of self-determination is a fundamental human right and an established tenet of ethical medical research and clinical practice. The untenable effects of ignoring informed consent have been thoroughly described elsewhere (Pincus et al. 1999). The recent National Bioethics Advisory Commission (NBAC) report has provoked controversy because of its specific focus on psychiatric patients as being potentially vulnerable to impaired decision making, as well as for other perceived deficits (Carpenter and Vasi 1999; Michels 1999; National Bioethics Advisory Commission 1998). Although a subject of debate, several commentators criticize the recommendations of the commission for their potentially stigmatizing effects. Thus, it has been pointed out that not just patients with psychiatric disorders, but also patients with a variety of other medical conditions, have been shown to be potentially vulnerable to impaired decision making (Oldham et al. 1999; Roberts 1998; Roberts and Roberts 1999). Furthermore, it has been argued that the NBAC report did not take into consideration the available research on decision making by psychiatric patients, which indicates the variable nature of performance by patients with psychiatric illnesses as well as patients with medical or surgical conditions (Roberts 1998; Roberts and Roberts 1999). In addition, several studies recently found that consent-related capacity of patients with schizophrenia was enhanced with straightforward educational interventions (Wirshing et al. 1998; Carpenter et al. 2000).

The importance of obtaining proper informed consent from research subjects and patients cannot be over-

From the Department of Psychiatry (LBD), University of California, San Diego, San Diego, California, and Psychiatry Service, Veterans Affairs San Diego Healthcare Services, San Diego, California (DVJ).

Address correspondence to: Dilip V. Jeste, M.D., Professor of Psychiatry and Neurosciences, Geriatric Psychiatry division 116A-1, VA San Diego Healthcare Services, 3350 La Jolla Village Drive, San Diego, CA 92161. Tel.: (858) 534-4020; Fax: (858) 552-7404; E-mail: djeste@ucsd.edu

Received 25 July 2000, revised 27 September 2000; accepted 10 October 2000.

Published by Elsevier Science Inc.
655 Avenue of the Americas, New York, NY 10010

0893-133X/01/$–see front matter
PII S0893-133X(00)00218-9

emphasized, as noted by Lieberman and Aghajanian (1999). Adequate informed consent consists of three required elements: *full information*; *voluntary participation*; and *capacity* to make a decision (Appelbaum and Roth 1982; Christensen et al. 1995). Capacity for decision making, in turn, is composed of four functional abilities: the ability to *understand* relevant information; the ability to *appreciate* the nature of a situation and its likely consequences; the ability to *reason* with the information and weigh options logically; and the ability to *communicate* the choice (Appelbaum and Grisso 1988; Grisso and Appelbaum 1998; Pincus et al. 1999).

Researchers have studied decision-making capacity using a variety of instruments, including the MacArthur Competence Assessment Tools for treatment and research (Appelbaum et al. 1999; Grisso and Appelbaum 1998), among others (Bean et al. 1994; Janofsky et al. 1992; Saks and Behnke 1999; Miller et al. 1996).

An extensive literature consistently reports a variety of problems related to the understanding component of decision making (Taub and Baker 1984; Taub 1986; Verheggen and van Wijmen 1996; Edwards et al. 1998; Silva and Sorrell 1988; Sugarman et al. 1998; Gotay 1991). These deficits are, however, not restricted to patients with psychiatric diagnoses or cognitive impairments. Many physical illnesses, as well as medications, can place patients at risk for impaired understanding of research or treatment (Sugarman et al. 1999; Grisso and Appelbaum 1998). In fact, studies comparing the abilities of patients with and without psychiatric illness have shown that the presence of a psychiatric disorder, albeit a risk factor, does not predetermine whether a patient can understand key information (Appelbaum and Roth 1982; Appelbaum et al. 1999; Grisso and Appelbaum 1995; Appelbaum and Grisso 1995; Lidz et al. 1984; Meisel and Roth 1981; Roth et al. 1987; Stanley et al. 1987; Sugarman et al. 1999; Carpenter et al. 2000). Several investigators have demonstrated that individuals with psychiatric disorders do possess definite strengths related to decision-making capacity (Grisso and Appelbaum 1998; Carpenter et al. 2000; Kleinman et al. 1993; Stanley et al. 1981; Soskis 1978).

No generalized agreement dictates how to measure understanding, despite some attempts to devise assessment tools (Miller et al. 1996; Grisso and Appelbaum 1998). One obstacle is the definition of "understanding." To understand a treatment or research protocol, a patient must receive, encode, retain, and process the information. This necessarily involves sensory modalities, attention, memory, and cognition. Terms used in the literature to describe this complex process include "understanding," "comprehension," "knowledge," and "recall." Recall alone does not imply understanding. Furthermore, long-term recall is not always necessary, for example, in immediate treatment decisions (Grisso and Appelbaum 1998). Knowledge also does not always imply understanding.

Despite this lack of agreement on how to define and measure understanding, problems with understanding of both research and treatment protocols have been widely reported. Deficiencies in patients' understanding include lack of awareness of being a subject in a research study; poor recall of supplied information; lack of understanding of randomization procedures and placebo treatments; inadequate recall of important risks of procedures or treatments; lack of awareness of the ability to withdraw from a research study at any time; the "therapeutic misconception" (i.e., the belief that treatment decisions are being made solely with the individual subject's benefit in mind); and confusion about the dual roles of physician/researchers (Levine 1992; Silva and Sorrell 1988; Verheggen and van Wijmen 1996; Edwards et al. 1998; Appelbaum et al. 1982; Sugarman et al. 1998; Robinson and Merav 1976; Muss et al. 1979; Cassileth et al. 1980).

Clearly, no single method to improve understanding and/or recall offers a panacea for the array of potential pitfalls listed above. A critical review of methods to improve understanding should reveal effective strategies and suggest potential areas for further investigation. Although the number of articles published on informed consent has increased substantially over the last 30 years (Kaufmann 1983; Sugarman et al. 1999), the number of studies that actually test methods to improve the informed consent process has been limited.

One positive outgrowth of the controversy surrounding the NBAC report has been a call for more rigorous research into informed consent procedures and decision-making capacity in patients at *potential* risk for impairments (Hyman 1999; Charney et al. 1999; Jeste et al. 1999). As an example, further research is needed into the various factors (i.e., cognitive as well as subjective influences) that affect decision making by psychiatric patients (Childress and Shapiro 1999; Roberts and Roberts 1999; Oldham et al. 1999). This is crucial, because even in patients with presumably intact decision-making capacity, poor understanding of information about proposed treatments or research protocols is common (Edwards et al. 1998; Sugarman et al. 1998).

In this article, we focus on whether understanding of informed consent can be improved with educational interventions. As a starting point, a review of the extant literature on this topic will help clarify what is currently known and what remains to be understood about how researchers and clinicians can improve understanding of informed consent. Furthermore, the limitations of studies reviewed here underscore the need for an increase in the amount and quality of the research conducted in this area. Because much of this research has been conducted with nonpsychiatric patients, we include studies from different disciplines in the hope of discerning patterns regarding what kinds of interventions may be helpful, regardless of a patient's diagnosis.

We conducted a literature search for empirical studies of informed consent using the Medline (from 1966 to present) and PsycINFO (from 1967 to present) databases. We searched for articles using the major subject term "informed consent," reviewed these by title and abstract, and retrieved studies that fit our inclusion criteria. Review of these articles' texts and references led to identification of other relevant sources. We also carefully searched a recent annotated bibliography on empirical research on informed consent (Sugarman et al. 1999), as well as several reviews of this topic (Taub and Baker 1984; Taub 1986; Verheggen and van Wijmen 1996; Edwards et al. 1998; Silva and Sorrell 1988; Sugarman et al. 1998; Gotay 1991).

For the final group of articles, we included English language studies of adults that evaluated an intervention(s) designed to improve subjects' understanding of consent information. We included studies from a variety of disciplines. We excluded studies that were purely descriptive (e.g., studies of the readability of consent forms without an intervention to improve readability). We also excluded studies of other aspects of consent (e.g., willingness to consent, associated anxiety levels, satisfaction with consent) that did not include an intervention to improve understanding. Intervention studies that examined other aspects of informed consent were included only if they also studied a measure of patients' understanding or recall.

The studies reported on a wide variety of approaches to improving patients' understanding of informed consent. The patient populations, sample sizes, methods, and outcome measures varied widely. In addition, the studies examined either consent for research or consent for treatment and were conducted in a variety of disciplines (i.e., psychiatry, surgery, and medicine). For these reasons, we chose not to conduct a meta-analysis.

Study Characteristics

Of the 34 studies, 12 examined patients scheduled for a surgical or radiological procedure, eight included healthy volunteers, five examined patients with psychiatric disorders, four looked at patients with cancer, three included frail geriatric patients or long-term care residents, one enrolled pregnant women, one studied injection drug users, and one examined patients with advanced HIV disease.

Outcome measures varied widely, from multiple-choice and true/false questions to structured interviews. Some tested understanding immediately after the consent procedure; whereas, others used both immediate and delayed measures of understanding and recall. Other authors have commented that, although many studies purport to measure understanding or comprehension, what they actually measure is memory for presented information (DeRenzo et al. 1998; Lavori et al. 1999; Silva and Sorrell 1984). Often, the terms "comprehension," "knowledge," "understanding," and "recall" are used interchangeably.

We identified a number of studies that attempted to measure the effectiveness of various interventions over time, thereby providing some information, not merely about immediate recall but also about the durability of information provided (Simes et al. 1986; Taub et al. 1981; Taub and Baker 1983; Tindall et al. 1994; Tymchuk et al. 1988). Because the timing of measurement of understanding varied greatly among studies, caution is indicated when comparing results. Poor performance on outcome measures assessed after a delay of 1 to several weeks may indicate only that memory is fallible, not that the subjects failed to understand information when it was initially provided (Silva and Sorrell 1984). Nevertheless, certain strategies may help subjects remember the material beyond the initial testing period (Kleinman et al. 1996; Taub et al. 1981; Tindall et al. 1994; Wirshing et al. 1998). Interventions that showed a benefit when delayed recall (generally several weeks later) was tested included an additional interaction (telephone call or information visit) with a nurse, (Dodd and Mood 1981; Aaronson et al. 1996) informational videotape, (Weston et al. 1997) written (vs. or in addition to oral) preoperative information, (Armstrong et al. 1997; Askew et al. 1990; Morrow et al. 1978) simplified and illustrated presentations, (Krynski et al. 1994; Tymchuk et al. 1988; Tymchuk and Ouslander 1991), and corrected feedback or multiple learning trials (Kleinman et al. 1993; Kleinman et al. 1996; Taub et al. 1981; Wadey and Frank 1997; White et al. 1995; Wirshing et al. 1998).

Consent for Research

We categorized the studies by consent for research or for a treatment or procedure (including hypothetical treatments) to make the tables more accessible to researchers or clinicians who wanted to incorporate the findings of these studies into their own efforts to improve subjects' or patients' understanding of informed consent.

Several authors have noted the importance of distinguishing between informed consent for research, which differs fundamentally from consent for treatment (Appelbaum et al. 1982; Taub et al. 1986). Participants in clinical research need to understand the difference between individualized reatment and research protocols. For example, in research, randomized assignment to treatment arms may occur, placebos may be given, and—in many instances—there is a possibility that subjects will not benefit directly from the experimental intervention. When subjects do not understand these distinctions and assume that decisions about their care will be made only for these distinctions and assume that de-

cisions about their care will be made only for their individual benefit, this is termed "the therapeutic misconception" (Appelbaum et al. 1982). Because of these important distinctions, we separated these categories of consent for research and consent for treatment in our analysis.

We found that in both categories, educational strategies to improve understanding were generally successful. Several authors noted that patients had more than a passing interest in being informed of the purpose, procedures, and risks of the actual treatment recommended for them—for example, when chemotherapy drugs had potentially lethal side effects (Dodd and Mood 1981) or when the risks of intravascular contrast material were not previously known to patients undergoing radiological procedures (Hopper and Tyler 1989). We found, however, that even in studies of consent for hypothetical treatments, patients showed improved understanding with the interventions described (Epstein and Lasagna 1969; Tymchuk et al. 1988; Krynski et al. 1994; Tymchuk and Ouslander 1991).

Table 1 lists 16 studies of consent for research. Eleven of these demonstrated greater understanding among patients in the experimental condition.

Positive Studies. The 11 positive studies included comparisons of simplified with the standard (complex) consent forms (Bjorn et al. 1999; Young et al. 1990); comparison of uniform total disclosures with individualized disclosures personalized by the physician (Simes et al. 1986); a telephone-based intervention to inform patients more thoroughly about a clinical trial (Aaronson et al. 1996); a step-wise consent process (Rikkert et al. 1997); the use of interviews, repetition, corrected feedback, and multiple learning trials (Carpenter et al. 2000; Taub et al 1981; Wirshing et al. 1998), and having patients speak or write about the consent information (Sorrell 1991). In two studies, patients served as their own controls, with change over time being the reported outcome measure (Rikkert et al. 1997; Wirshing et al. 1998). Two of the positive investigations used videotape to enhance the informed consent process (Fureman et al. 1997; Weston et al. 1997). Both videotape studies reported that patients in the intervention group demonstrated less decrease in knowledge over time (2 weeks to 2 months later).

Negative or Inconclusive Studies. Of the five negative studies, two were inconclusive regarding the effect of simplified, more readable consent forms on patient understanding (Taub et al. 1986; Taub et al. 1987). Two other reports on corrected feedback (Taub and Baker 1983) and the addition of an oral discussion to written information (Tindall et al. 1994) produced mixed results. The latter study demonstrated improvement from pre- to postconsent, but the oral discussion did not add significantly to this improvement. Benson et al. (1985) studied "improved" versus "natural" disclosures and reported mixed results; that is, patients with schizophrenia did not benefit from the improved disclosures; whereas depressed patients benefited somewhat. In this study, however, over all patient understanding remained low in both groups, despite attempts to improve the disclosure process.

Consent for Treatment

Table 2 summarizes 18 studies of consent for treatment; 14 of them found the experimental condition to be of some benefit.

Positive Studies. Of the 14 positive reports, three compared varying degrees of oral and written consent (Armstrong et al. 1997; Dawes et al. 1992; Inglis and Farnill 1993); another compared short, medium, and long forms of written information (Epstein and Lasagna 1969). Two other positive reports examined the effects of providing illustrated, highly readable, large-print versions of clinical vignettes (Tymchuk and Ouslander 1991; Krynski et al. 1994; Tymchuk et al. 1988). Other positive interventions provided take-home information sheets 1 to 3 days before a scheduled procedure (Askew et al. 1990; Morrow et al. 1978), had a nurse review the consent information with the patient (Dodd and Mood 1981), gave corrected feedback to patients (Kleinman et al. 1993), and had patients orally repeat the consent information (Wadey and Frank 1997; White et al. 1995). A videotape intervention (which included "advance organizers" that alerted patients to the material to be presented, on-screen graphics, and summaries of key points) helped patients score better on a knowledge test (Agre et al. 1994). Another study used an interactive video that allowed patients to receive more information if they chose to (Hopper et al. 1994).

Negative or Inconclusive Studies. The four negative reports involved using oral and/or written consent of varying levels of detail (Hopper and Tyler 1989; Stanley et al. 1998), provision of a written consent form at varying times (24 to 72 h vs. 15 to 60 min) before a radiological examination (Neptune et al. 1996), and the use of a professionally prepared video about ECT that augmented written material (Westreich et al. 1995).

Role of Psychiatric Illness or Cognitive Impairment

Several researchers examined degree of cognitive impairment and psychiatric symptoms as covariates. Rikkert et al. (1997) noted that mildly demented patients demonstrated poorer understanding that nondemented patients; patients with major depression, however, did not differ from the nondepressed ones. Notably, in this study, understanding increased significantly in both mildly demented and nondemented patients after a

1-week consent "try out." Wirshing et al. (1998) found delayed understanding was negatively correlated with scores on the conceptual disorganization subscale of the Brief Psychiatric Rating Scale (BPRS) (Overall and Gorham 1986); however, patients with schizophrenia did show improvement in understanding and retention of information with the more rigorous, educational consent process that was used. Carpenter et al. (2000) found that although poor performance on a decisional capacity instrument was moderately correlated with severity of psychiatric symptoms (assessed by the BPRS), performance was even more strongly influenced by the degree of cognitive impairment. Nonetheless, patients with schizophrenia who received the educational intervention improved their performance to the same level as non-ill comparison subjects.

Predictors of Performance

The variables most often examined were age, education, and vocabulary level. Gender was infrequently examined as a variable associated with understanding, with inconsistent results (Hopper et al. 1994; Morrow et al. 1978; White et al. 1995). Of 10 studies that evaluated an age effect, six found that performance was significantly and inversely related to age (Taub et al. 1986; Taub et al. 1987; Krynski et al. 1994; Neptune et al. 1996; Aaronson et al. 1996; Agre et al. 1994), another found a similar, but nonsignificant, trend toward this association (Morrow et al. 1978), and three investigators found no correlation between age and understanding (Tymchuk et al. 1988; Sorrell 1991; White et al. 1995). One of the three studies that found no age effect examined patients within a fairly narrow age range: Tymchuk et al. (1988) enrolled long-term care residents (mean age 84 years, SD 5 years). Sorrell (1991) studied 80 healthy women consenting to a breast self-examination teaching program (mean age 40 years, standard deviation and range not given), raising the question of whether there was a sufficient age range to detect an age effect. Interestingly, despite the negative association of age with understanding, even older patients derived significant benefits from education interventions in a number of studies (Krynski et al. 1994; Rikkert et al. 1997; Taub et al. 1981; Taub et al. 1987; Tymchuk et al. 1988; Tymchuk and Ouslander 1991).

Nine studies examined the relationship between education and understanding. Eight reported a positive association (Bjorn et al. 1999; Young et al. 1990; Taub et al. 1986; Taub et al 1987; Sorrell 1991; Neptune et al. 1996; Aaronson et al. 1996; Agre et al. 1994). Two studies that evaluated patients' vocabulary levels (as measured by the vocabulary subtest of the Wechsler Adult Intelligence Scale [WAIS]) found that performance on immediate as well as delayed tests of understanding varied directly with vocabulary level (Taub and Baker 1983; Taub et al. 1981).

In this review of interventions to improve patients' understanding of information given during informed consent, we were particularly interested in studies of patients with psychiatric illnesses or cognitive impairments. Several studies found that specific diagnoses per se do not render patients vulnerable to impaired decision making; on the other hand, cognitive impairments associated with diverse conditions can place medical, surgical, and psychiatric patients at risk for impaired understanding, thus potentially impairing their decision-making capacity (Carpenter et al. 2000; Krynski et al. 1994; Tymchuk et al. 1988; Tymchuk and Ouslander 1991; Wirshing et al. 1998; Jaffe 1986). Previous reports have also illustrated this point (Grisso and Appelbaum 1991; Holzer et al. 1997; Grisso and Appelbaum 1998). Patients with schizophrenia, as well as other populations, show a great deal of variance in performance. More important, patients in the studies reviewed have demonstrated substantial and clinically significant improvements in their performance on informed consent assessments when educational interventions were utilized (Rikkert et al. 1997; Carpenter et al. 2000; Kleinman et al. 1993; Wirshing et al. 1998). These observations suggest that clinicians may employ specific methods to identify those patients who may be at risk for inadequate understanding. More research is needed to ascertain what specific factors place individuals at risk for impaired decision making and how best to modify these risk factors (Roberts and Roberts 1999).

Summary of Findings

Twenty-five out of the 34 studies reviewed found that patients' understanding or recall showed improvement with a wide variety of interventions. Some strategies, however, were consistently more effective than others. More highly structured and more uniform consent processes, better organized, shorter and more readable consent forms, and simplified and illustrated formats all improved patients' understanding. Corrected feedback, multiple learning trials, "advance organizers" (which alert patients to information about to be presented), and summaries of information also enhanced understanding. Highly detailed information, however, was not consistently associated with better understanding. Augmenting or replacing the consent form (e.g., with a videotape) showed some promise, but these studies were limited in number, and results were inconsistent.

Certain types of strategies may help patients remember the material beyond the initial testing period. These strategies included an additional telephone discussion or informational visit from a nurse (Aaronson et al. 1996; Dodd and Mood 1981), an informational videotape (Weston et al. 1997), written (versus or in addition to oral) preoperative information (Armstrong et al.

Table 1. Studies on Enhancing Informed Consent for Research

Author	Subjects	*n*	Age (Range in yrs)	Gender (% Male)	Education Level	Control Condition (CC)	Experimental Condition (EC)	Outcome Measures	Results (Group Differences)	Results (Predictors of "Understanding")
Aaronson et al. 1996	Cancer pts	EC: 90 CC: 90	21–77	13	⩽HS: 84%	Standard informed consent plus written summary.	Standard informed consent plus telephone interview with oncology nurse.	Semistructured interview 1 week after consent	EC better than CC	Younger age and more education
Benson et al. 1985	Group A: Pts with depression Group B: Pts with schizophrenia	A: 24 B:24	A: 59–71 B: 21–55	94	⩽HS: 56%	Natural disclosures: either (1) standard informed consent or (2) routine investigator disclosure plus instructional video	Improved disclosures: either (1) improved instructional video or (2) neutral educator and researcher providing information	Standardized interview	Group A: EC better than CC Group B: No difference	Not described
Bjorn et al. 1999	Group A: Pts with hypertension Group B: NC women	A: 135 B: 100	A: 62–92 B: 25–45	A: 25 B: 0	>5 yrs postprimary education: A: 24% B: 29%	Original information leaflet	Revised information leaflet (shorter sentences, lay language, resequencing of information)	Understanding of proposed studies based on multiple-choice questionnaire given immediately after leaflet	Group A: EC better than CC Group B: No difference	Level of education in Group A but not Group B
Carpenter et al. 2000	Group A: Pts with schizophrenia Group B: NC	A: 30 B: 24	Mean 40	67	Mean yrs: 12	None	Group A subjects who performed poorly on decisional capacity measure ($n = 20$) received educational intervention (review with repetition and prompts). Some inpatients used computerized interactive materials.	Performance on decisional capacity instrument (MacCAT-CR; Appelbaum and Grisso 1995)	Before the educational intervention, Group B better than Group A After intervention, Group A = Group B	Better cognitive status (strongly); less severe symptomatology (modest association; significant for Understanding and Reasoning subscales of MacCAT-CR only)
Fureman et al. 1997	Injection drug users	EC: 98 CC: 88	22–69	80	Not described	Small group session: Pretest, standard pamphlet, Q&A, post-test	Small group session: Pretest, video, Q&A, post-test	14 questions (agree/disagree). Also retested 1–2 months later	Both EC and CC: improved scores on post-test vs. pretest (but no between groups difference) At 1–2 months, EC showed less decline in scores than CC	Not described
Rikkert et al. 1997	Frail geriatric pts	53	Not described	32	Not described	None	Step-wise consent procedure (1 week tryout period) then informed consent requested	10 multiple-choice questions; tested before and after the 1-week tryout	Improved comprehension after the 1-week tryout	Higher MMSE
Simes et al. 1986	Cancer pts	EC: 28 CC: 29	EC: 31–68 CC: 40–74	EC: 18 CC: 38	EC: ⩽HS: 71% CC: ⩽HS: 72%	Individual approach, at discretion of each doctor to provide informed consent	Uniform policy of total disclosure of all relevant information	Questionnaire assessing understanding soon after consent	EC better than CC at immediate assessment; no difference when retested 3 to 4 weeks later	Not described
Sorrell 1991	NC	EC1: 26 EC2: 26 CC: 28	Mean 40	0	Mean yrs: 13	Standard consent	EC1: Wrote responses to 3 questions EC2: Spoke about the same 3 questions	20-item multiple-choice test 45 minutes after consent	EC1 better than CC No difference between EC2 and CC	Education but not age.
Taub et al. 1981	NC	EC: 42 CC: 45	57–87	20	Not described	Standard consent	Answered eight multiple-choice questions (information sheet available) with corrected feedback	eight multiple-choice questions; immediately and retested 2–3 weeks later	EC: immediate comprehension better than delayed memory EC better than CC at 2–3 weeks retest	EC: vocabulary level
Taub and Baker 1983	NC	EC: 50 CC:50	59–88	18	Not described	Single comprehension test with corrected feedback; information available during immediate but not delayed testing	Up to three comprehension trials, with corrected feedback; information available during immediate but not delayed testing	Eleven of 22 multiple-choice questions at immediate testing; all 22 questions given at 2–3 week delayed testing	EC: improved performance from first to last trial during immediate testing session Otherwise no differences.	Vocabulary level (for both immediate and delayed performance)

continued

Table 1. (continued)

Author	Subjects	*n*	Age (Range in yrs)	Gender (% Male)	Education Level	Control Condition (CC)	Experimental Condition (EC)	Outcome Measures	Results (Group Differences)	Results (Predictors of "Understanding")
Taub et al. 1986	Pts scheduled for cardiac catheterization	188	3 groups: <50 50–59, and 60–69	99	3 groups: ≤8 yrs, 9–11 yrs, and ≥ 12 yrs, respectively	Low readability (college level) information sheet	High readability (7th grade reading level) information sheet	Ten multiple-choice questions given immediately after information sheet; allowed to use information sheet to answer; corrected feedback, maximum two trials	Effects of readability inconsistent (alone or in combination with other variables)	Education, younger age
Taub et al. 1987	NC	235	3 groups: 60–69, 70–79, and 80–89	21%	3 groups: <12 yrs, =12 yrs, and >12 yrs, respectively	Low readability (college level) information sheet	High readability (7th grade reading level) information sheet (same total length as low readability version); also three different typefaces.	Comprehension (eight-item multiple choice test), with two trial option	No significant effects attributable to readability (alone or in combination with other variables)	Education, younger age
Tindall et al. 1994	Pts with advanced HIV disease	EC: 61 CC: 52	24–58	Not described	≥HS: 100%	Consent form (readability = 15th grade) plus written information (readability = 13th grade)	Consent form plus written information, plus verbal discussion with practitioner	Eight-item questionnaire (preconsent and 1 week later)	EC and CC both showed improvements from pre- to postconsent; no between-group differences from pre- to postconsent	Not described
Weston et al. 1997	Pregnant women	EC: 42 CC: 48	EC: 31–40 CC: 18–31	0	≤HS: 7%	Written information	Information video about clinical trial	Eleven questions, tested immediately and 2–4 weeks after consent	Immediate test: no between groups differences; at 2–4 week post-test, EC retained more knowledge than CC	Not described
Wirshing et al. 1998	Pts with schizophrenia	49	Mean 46	90	Mean yrs: 13	None	Structured consent procedure	Yes/no, true/false, and short answer questions; immediate testing and after 7-day delay	Improved scores on day seven trial vs. first trial	Less conceptual disorganization on BPRS (day 7 trial)
Young et al. 1990	NC	EC: 338 CC: 328	18–72	Not described	≤HS: 38% Some college: 25% College grad: 37%	Low readability (16th grade level) information sheet	High readability (6th grade reading level) information sheet (same content as low readability form)	21 multiple choice questions; subjects randomized to answer questions immediately vs. after 15-min delay	EC greater than CC No effect of delay on comprehension	Education

EC = experimental condition; CC = control condition; yrs = years; HS = high school; Pt(s) = patient(s); NC = normal controls; BPRS = Brief Psychiatric Rating Scale.
All results statistically significant unless otherwise stated.

Table 2. Studies on Enhancing Informed Consent for Treatment

Author	Subjects	*n*	Age (Range in yrs)	Gender (% Male)	Education Level	Control Condition (CC)	Experimental Condition (EC)	Outcome Measures	Results (Group Differences)	Results (Predictors of "Understanding")
Agre et al. 1994	Colonoscopy pts	EC1: 68 EC2: 66 CC: 67	21–86	45	≤HS: 32%	Discussion alone	EC1: video alone EC2: video plus discussion	13 multiple-choice questions (10 minutes after consent)	EC1 and EC2 better than CC	Education, younger age
Armstrong et al. 1997	Surgical pts	EC: 137 CC: 132	Mean: 44	45	≥"A-level": 13%	Verbal preoperative information only about risks and benefits	Same as CC, with written preoperative information	Nine days postoperative interview assessing recall of warnings	EC greater recall than CC	Not described
Askew et al. 1990	Surgical pts	EC: 42 CC: 58	23–82	48	Not described	Standard discussion with doctor in hospital before operation	Same as CC; information mailed before admission	Interview (2 to 7 days postoperatively)	EC better than CC	Not described
Dawes et al. 1992	Surgical pts	CC1: 49 CC2: 47 EC1: 50 EC2: 44	Range of mean yrs: 30–37	56	Majority ≤"O-level"	CC1: No consent interview (until after study) CC2: Informal interview (by author)	EC1: Interview guided by written information, but sheet not read by or given to subject EC2: Written information read with pt before signing consent, also given to pt prior to assessment of recall	For CC2, EC1, and EC2 only; Several hours after first interview, assessed for recall	EC1 and EC2 recalled higher mean number of complications per pt	Not described
Dodd and Mood 1981	Chemotherapy pts	EC: 12 CC: 12	40–79	58	Median 10 yrs	Routine nurse visit	Visit from nurse to review consent information, plus summary card to keep	20-item questionnaire 3–4 weeks after nurse's visit	EC better than CC	Not described
Epstein and Lasagna 1969	NC	EC1: 22 EC2: 22 EC3: 22	18–48	3	Mean yrs: 14	None	EC1: Short form (1 page) EC2: Medium form (more detailed) EC3: Long form (more detailed than both short and medium)	Yes/no, short answer, and multiple-choice questions	Comprehension by group (as % correct): EC1 > EC2 > EC3 (all group means different from each other)	Not described
Hopper and Tyler 1989	CT scan pts	EC1: 25 EC2: 25 EC3: 25 EC4: 25	All >18	Not described	Mean yrs: 13–14	None	EC1: No counseling EC2: Short written consent, no verbal counseling EC3: Detailed written consent, no verbal counseling EC4: Detailed verbal counseling from physician	Quiz after CT study; not allowed to use materials during test	No differences among four conditions	Not described
Hopper et al. 1994	Radiology pts	EC: 80 CC: 80	Mean 53	50	13	Written consent form (8th grade reading level)	Interactive video. No written forms	EC: multiple-choice test, immediate corrected feedback CC: multiple-choice test after the written consent	No difference between EC and CC	EC: women only
Inglis and Farnill 1993	Surgical pts	EC: 20 CC: 20	EC: 26–80 CC: 21–77	27	Mean yrs: 10	Routine information	Detailed information	Pts' estimates of incidence of complications; immediately tested	EC greater accuracy of estimates than CC for 2 rare complications; no differences in accuracy of estimates of common risks	Not described
Kleinman et al. 1993, 1996	Pts with schizophrenia	EC: 11 CC: 15	Not described	Not described	Mean yrs: 13	Baseline questionnaire, information sheet read aloud, post-test. 4-week follow-up: questionnaire	Same as CC, but at 4-week follow-up, incorrect answers reviewed and given information sheet to take home	13-items re: neuroleptics (true/false/don't know/multiple-choice questions). 6-month and 2-year follow-up.	EC and CC both showed improved knowledge vs. baseline at 6-month and 2-yr follow-up; no significant differences between the two groups over time	Not described

continued

Table 2. (continued)

Author	Subjects	*n*	Age (Range in yrs)	Gender (% Male)	Education Level	Control Condition (CC)	Experimental Condition (EC)	Outcome Measures	Results (Group Differences)	Results (Predictors of "Understanding")
Krynski et al. 1994	Group A: Long-term care Group B: NC	A: 34 B: 34	A: 75–96 B: 63–89	22	Not described	None	Illustrated vignette, large print captions (grade 5 reading level)	Pre- and postvignette knowledge tests, using true/false questions	No differences in prevignette knowledge; Group B > group A (postvignette); both A, B improved from pre- to postvignette.	Younger age and less cognitive deficit (postvignette scores only).
Morrow et al. 1978	Radiation oncology pts	EC: 40 CC:37	14–85	54	Not described	Routine consent: clinical consultation then immediately signed consent; knowledge assessed within 24 h	Copy of consent given to pts to take home after clinical consultation; at next appointment, knowledge assessment interview and signed consent form	Brief structured interview	EC better than CC (in three of the seven areas tested)	Younger age (trend only); men: greater benefit vs. women
Neptune et al. 1996	CT scan pts	160	50%≤55	50	Not described	Consent form 15–60 min before procedure	Consent form (8th grade reading level) provided 24–72 hours before procedure	7 multiple-choice questions	No difference between EC and CC	Education, younger age
Stanley et al. 1998	Surgical pts	32	28–84	59	Not described	Standard information	Same as CC, plus detailed written or oral information, or detailed written and oral information	Questionnaire (given sometime between obtaining consent and procedure itself)	No significant differences among groups	Not described
Tymchuk et al. 1988; Tymchuk and Ouslander 1991	Long-term care residents	70	Mean 84	24	Mean yrs: 8	Standard format (high school reading level) for informed consent; all conditions used large print	Simplified (5th grade level) and storybook (simplified plus illustrations) materials for high and low-risk medical procedures	Comprehension immediately and at 1 week: initial open-ended then true/false questions; assessed primacy and recency effects	EC > CC (immediate testing); scores declined after 1 week, more so for standard format; primacy and recency effects at initial testing (low-risk vignettes only), vs. forgetting curves (high-risk vignettes)	Cognitive status, not age of education
Wadey and Frank 1997	Surgical pts	EC: 8 CC: 12	Not described	Not described	Not described	Standard surgical consultation	Same as CC and required to verbalize accurately risks, benefits of operation	Three multiple-choice questions 1 month after consent obtained	EC higher number of correct responses than CC	Not described
Westreich et al. 1995	Pts with depression	EC: 11 CC: 7	Mean 63	Not described	EC: 9–10 CC: 12–13	Standard written consent document	Video in addition to written consent document	Eight true/false questions, immediately after signing consent	No differences	Not described
White et al. 1995	Thoracic biopsy pts	E: 23 C: 27	E: 35–73 C: 18–80	54	Not described	Standard informed consent	Same as CC and oral potential complications, corrected feedback	Mean number of recalled risks, tested at time of discharge (usually 2 h after procedure)	EC greater recall than CC	Men; not age

EC = experimental condition; CC = control condition; yrs = years; HS = high school; Pt(s) = patient(s); NC = normal controls; BPRS = Brief Psychiatric Rating Scale.
All results statistically significant unless otherwise stated.

1997; Askew et al. 1990; Morrow et al. 1978), simplified and illustrated presentations (Krynski et al. 1994; Tymchuk et al. 1988; Tymchuk and Ouslander 1991), and corrected feedback and multiple learning trials (Kleinman et al. 1993; Kleinman et al. 1996; Taub et al. 1981; Wadey and Frank 1997; White et al. 1995; Wirshing et al. 1998).

In examining whether understanding was correlated with specific demographic variables, we found that educational and vocabulary levels of patients were consistently and positively associated with measures of understanding in a variety of studies. Older patients with less education seemed to be more vulnerable to poor understanding (Taub et al. 1986; Taub et al. 1987). Age alone, however, was not consistently associated with decrements in performance, and, in fact, older patients benefited from strategies to improve their understanding (Krynski et al. 1994; Rikkert et al. 1997; Taub et al. 1981; Taub et al. 1987; Tymchuk et al. 1988; Tymchuk and Ouslander 1991).

We should point out limitations of this review. As in many reviews of the literature, we most likely missed a few articles, and we did not include those published in languages other than English. In addition, a tendency among authors and journals to publish positive rather then negative studies might have resulted in a bias toward positive data. There may also have been subject selection biases in individual studies. For example, patients who were very ill or who were thought to lack the cognitive capacity to participate in research were likely excluded. In research on informed consent, this is to some degree inevitable, because patients must be able (or must be thought to be able) to provide adequate consent.

Another limitation of this review pertains to the studies themselves. The reports were heterogeneous in terms of both patients and interventions. In addition, individual studies had several common limiting aspects. For example, some investigators did not describe particular features of the study populations, such as age range or education level. A few studies did not report the readability level of consent forms used, despite stating that the consent documents were simplified or revised. Some reports did not provide full details of the interventions or outcome measures used. In some cases, small sample sizes limit the generalizability of the results. Finally, some studies did not analyze possible confounding variables, such as correlations between age or education and understanding.

Directions for Future Research:

A growing body of literature supports the need to enhance the informed consent process. Below are a few areas for further research.

Use of New Technologies. The emergence of multimedia, interactive, and web-based technologies should help further the exploration of novel methods for enhancing informed consent (Rosoff 1999). Interactive technology, for example, can create information tailored to specific patients' learning styles and preferences. Some groups are already using multimedia tools to inform potential research participant about key components of research (Jimison et al. 1998). Computers also can be used to test patients before, during, and after a consent procedure and provide feedback, review, and retesting.

Controlling for Effects of Memory on Understanding. The results of numerous studies reviewed here are confounded by the confusing between understanding and recall. Taub et al. (1981) suggest that allowing patients to refer to consent materials during assessments of understanding is one way to control for the effects of memory. Few of the studies reviewed here have adequately separated out the effects of memory from the outcome measure variously referred to as "comprehension," "understanding," or "knowledge." More rigorous techniques should be applied to study this aspect of informed consent, because patients' involvement in research or treatment does not occur only at one discrete point in time. Several groups are actively devising and testing methods to educate patients over time about research participation (Wirshing et al. 1998; Carpenter et al. 2000).

Risk Factors Related to Decision-Making Capacity. Studies of vulnerabilities of patients with psychiatric disorders represent a fruitful area for research. Some of the most important tasks will be to clarify individual variation in abilities to assimilate consent information, test for cognitive or other risk factors for poor understanding, and find ways to bring at-risk patients up to an adequate level of understanding (Wirshing et al. 1998; Carpenter et al. 2000). Incorporating cognitive testing into preconsent procedures may clarify associations between these functions and understanding of informed consent materials. Measuring other aspects of decision-making capacity, such as reasoning and appreciation, as well as risk factors for impairments in these domains, is also important. A crucial task is to explore methods to enhance understanding, appreciation, and reasoning related to the informed consent process. The limited nature of our conclusions in this article reflects the paucity of research in this area, particular pertaining to patients with psychiatric disorders.

Capacity for decision making should be viewed, not as an all-or-nothing state, but as multiple functional abilities along a continuum that can change over time. Furthermore, alleged deficits in patients' understanding of informed consent may, in fact, be related, at least partly, to poorly conceived, written, designed, or orga-

nized informed consent documents or processes. Hence, deficits in understanding or appreciation may be remediable with well-designed educational interventions. It is a truism that not everyone learns best in the same way. Therefore, we hope that clinicians and researchers will make increasing use of targeted interventions that take into account individual variation as well as potential risk factors for impaired understanding.

ACKNOWLEDGMENTS

This work was supported, in part, by NIMH Grants MH43693, MH51459, MH45131, MH49671 and by the Department of Veterans Affairs.

REFERENCES

Aaronson NK, Visser-Pol E, Leenhouts GHMW, Muller MJ, van der Schot ACM, van Dam FSAM, Keus RB, Koning CCE, ten Bokkel Huinink WW, van Dongen JA, Dubbelman R (1996): Telephone-based nursing intervention improves the effectiveness of the informed consent process in cancer clinical trials. J Clin Oncol 14:984–996

Agre P, Kurtz RC, Krauss BJ (1994): A randomized trial using videotape to present consent information for colonoscopy. Gastrointest Endosc 40:271–276

Appelbaum PS, Grisso T (1988): Assessing the patient's capacities to consent to treatment. N Engl J Med 319:1635–1638

Appelbaum PS, Grisso T (1995): The MacArthur treatment competence study. I. Mental illness and competence to consent to treatment. Law Hum Behav 19:105–126

Appelbaum PS, Grisso T, Frank E, O'Donnell S, Kupfer DJ (1999): Competence of depressed patients to consent to research. Am J Psychiat 156:1380–1384

Appelbaum PS, Roth LH (1982): Competency to consent to research: A psychiatric overview. Arch Gen Psychiat 39:951–958

Appelbaum PS, Roth LH, Lidz C (1982): The therapeutic misconception: Informed consent in psychiatric research. Int J Law Psychiat 5:319–329

Armstrong AP, Cole AA, Page RE (1997): Informed consent: Are we doing enough? Brit J Plast Surg 50:637–640

Askew G, Pearson KW, Cryer D (1990): Informed consent: Can we educate patients? J R Coll Surg Edinb 35:308–310

Bean G, Nishisato S, Rector NA, Glancy G (1994): The psychometric properties of the competency interview schedule. Can J Psychiat 39:368–376

Benson PR, Roth LH, Winslade WJ (1985): Informed consent in psychiatric research: Preliminary finding from an ongoing investigation. Soc Sci Med 12:1331–1341

Bjorn E, Rossel P, Holm S (1999): Can the written information to research subjects be improved?: An empirical study. J Med Ethics 25:263–267

Carpenter WT, Gold JM, Lahti AC, Queern CA, Conley RR, Bartko JJ, Kovnick J, Appelbaum PS (2000): Decisional capacity for informed consent in schizophrenia research. Arch Gen Psychiat 57:533–538

Carpenter WT, Vasi H (1999): NBAC process and recommendations: A critique from clinician investigators. BioLaw 11:S412–S416

Cassileth BR, Zupkis RV, Sutton-Smith K, March V (1980): Informed consent—why are its goals imperfectly realized? N Engl J Med 302:896–900

Charney DS, Innis RB, Nestler EJ, Davis KL, Nemeroff CD, Weinberger DR (1999): Increasing public trust and confidence in psychiatric research. Biol Psychiat, 46:1–2

Childress JF, Shapiro HT (1999): Almost persuaded: Reactions to Oldham et al. Arch Gen Psychiat 56:697–698

Christensen K, Haroun A, Schneiderman LJ, Jeste DV (1995): Decision-making capacity for informed consent in the older population. Bull Am Acad Psychiat Law 23:353–365

Dawes PJD, O'Keefe LO, Adcock S (1992): Informed consent: The assessment of two structured interview approaches compared to the current approach. J Laryngol Otol 106:420–424

DeRenzo EG, Conley RR, Love RC (1998): Assessment of capacity to give consent to research participation: State-of-the-art and beyond. J Health Care Law Policy 1:66–87

Dodd MJ, Mood DW (1981): Chemotherapy: Helping patients to know the drugs they are receiving and their possible side effects. Cancer Nursing 4:311–318

Edwards SJF, Lilford RJ, Thornton J, Hewison J (1998): Informed consent for clinical trials: In search of the best method. Soc Sci Med 11:1825–1840

Epstein LC, Lasagna L (1969): Obtaining informed consent: Form or substance. Arch Intern Med 123:682–688

Fureman I, Meyers K, McLellan T, Metzger D, Woody G (1997): Evaluation of a video-supplement to informed consent: Injection drug users and preventive HIV vaccine efficacy trials. AIDS Educ Prevent:330–341

Gotay CC (1991): Accrual to cancer clinical trials: Directions from the research literature. Soc Sci Med 33:569–577

Grisso T, Appelbaum PS (1991): Mentally ill and nonmentally ill patients' abilities to understand informed consent disclosures for medication. Law Human Behav 15:377–388

Grisso T, Appelbaum PS (1995): The MacArthur Treatment Competence Study. III. Abilities of patients to consent to psychiatric and medical treatments. Law Human Behav 19:149–174

Grisso T, Appelbaum PS (1998): Assessing Competence to Consent to Treatment: A Guide for Physicians and Other Health Professionals. New York, Oxford University Press

Holzer JC, Gansler DA, Moczynski NP, Folstein MF (1997): Cognitive functions in the informed consent evaluation process: A process: A pilot study. J Am Acad Psychiat Law 25:531–540

Hopper KD, Tyler HN (1989): Informed consent for intravascular administration of contrast material: How much is enough? Radiology 171:509–514

Hopper KD, Zajdel M, Hulse SF, Yoanidis NR, Ten Have TR,

Labuski MR, Houts PS, Brensinger CM, Hartman DS (1994): Interactive method of informing patients of the risks of intravenous contrast media. Radiology 192:67–71

Hyman SE (1999): Protecting patients, preserving progress: Ethics in mental health illness research. Academ Med 74:258–259

Inglis S, Farnill D (1993): The effects of providing preoperative statistical anaesthetic-risk information. Anaesth Intens Care 21:799–805

Jaffe R (1986): Problems of long-term informed consent. Bull Am Acad Psychiat 14:163–169

Janofsky JS, McCarthy RJ, Folstein MF (1992): The Hopkins Competency Assessment Test: A brief method for evaluating patients' capacity to give informed consent. Hosp Community Psychiat 43:132–136

Jeste DV, Palmer BW, Harris MJ (1999): Neuroleptic discontinuation in clinical and research settings: Scientific issues and ethical dilemmas. Biol Psychiat 46:1050–1059

Jimison HB, Sher P, Appleyard R, LeVernois Y (1998): The use of multimedia in the informed consent process. JAMIA 5:245–256

Kaufmann CL (1983): Informed consent and patient decision making: Two decades of research. Soc Sci Med 17:1657–1664

Kleinman I, Schachter D, Jeffries J, Goldhamer P (1993): Effectiveness of two methods for informing schizophrenia patients about neuroleptic medication. Hosp Commun Psychiat 44:1189–1191

Kleinman I, Schachter D, Jeffries J, Goldhamer P (1996): Informed consent and tardive dyskinesia: Long-term follow-up. J Nerv Ment Dis 184:517–522

Krynski MD, Tymchuck AJ, Ouslander JG (1994): How informed can consent be?: New light on comprehension among elderly people making decisions about enteral tube feeding. Gerontologist 34:36–43

Lavori PW, Sugarman J, Hays MT, Feussner JR (1999): Improving informed consent in clinical trials: A duty to experiment. Controlled Clin Trials 20:187–193

Levine R (1992): Clinical trials and physicians as double agents. Yale J Biol Med 65:65–74

Lidz CW, Meisel A, Zerubavel E, Carter M, Sestak RM, Roth LH (1984): Informed Consent: A Study of Decision Making in Psychiatry. New York, The Guilford Press

Lieberman JA, Aghajanian GK (1999): Caveat emptor: Researcher beware. Neuropsychopharmacology 21:471–473

Meisel A, Roth LH (1981): What we do and do not know about informed consent. JAMA 246:2473–2477

Michels R (1999): Are research ethics bad for our mental health? N Engl J Med 340:1427–1430

Miller CK, O'Donnell D, Searight R, Barbarash RA (1996): The Deaconess informed consent comprehension test: An assessment tool for clinical research subjects. Pharmacotherapy 16:872–878

Morrow G, Gootnick J, Schmale A (1978): A simple technique for increasing cancer patients' knowledge of informed consent to treatment. Cancer 42:793–799

Muss HB, White DR, Michielutte R, Richards F, Cooper MR, William S, Stuard JJ, Spurr CL (1979): Written informed consent in patients with breast cancer. Cancer 43:1549–1556

National Bioethics Advisory Commission (1998): Research involving persons with mental disorders that may affect decision-making capacity. Report of the recommendations of the National Bioethics Advisory Commission. Rockville, MD: National Bioethics Advisory Commission

Neptune SM, Hopper KD, Houts PS, Hartzel JS, Ten Have TR, Loges RJ (1996): Take-home informed consent for intravenous contrast media. Invest Radio 31:109–113

Oldham JM, Haimowitz S, Delano SJ (1999): Protection of persons with mental disorders from research risk: A response to the report of the National Bioethics Advisory Commission. Arch Gen Psychiat 56:688–693

Overall JE, Gorham DE (1986): The Brief Psychiatric Rating Scale. Psychol Repts 10:799–812

Pincus HA, Lieberman JA, Ferris S (1999): Ethics in Psychiatric Research: A Resource Manual for Human Subjects Protection. Washington, DC: American Psychiatric Association

Rikkert MGMO, van den Bercken JHL, ten Have HAMJ, Hoefnagels WHL (1997): Experienced consent in geriatrics research: A new method to optimize the capacity to consent in frail elderly subjects. J Med Ethics 23:271–276

Roberts LW (1998): The ethical basis of psychiatric research: Conceptual issues and empirical findings. Compr Psychiat 39:99–110

Roberts LW, Roberts B (1999): Psychiatric research ethics: An overview of evolving guidelines and current ethical dilemmas in the study of mental illness. Biol Psychiat 46:1025–1038

Robinson G, Merav A (1976): Informed consent: Recall by patients tested postoperatively. Ann Thorac Surg 22:209–212

Rosoff AJ (1999): Informed consent in the electronic age. Am J Law Med 25:367–386

Roth LH, Appelbaum PS, Lidz CW, Benson P, Winslade WJ (1987): Informed consent in psychiatric research. Rutgers Law Rev 39:425–441

Saks ER, Behnke SH (1999): Competency to decide on treatment and research: MacArthur and beyond. J Contemp Legal Issues 10:103–129

Silva MC, Sorrell JM (1984): Factors influencing comprehension of information for informed consent: Ethical implications for nursing research. Int J Nursing Studies 21:233–240

Silva MC, Sorrell JM (1988): Enhancing comprehension of information for informed consent: A review of empirical research. IRB: A Rev Human Subjects Res 10:1–5

Simes RJ, Tattersall MHN, Coates AS, Raghavan D, Solomon HJ, Smartt H (1986): Randomized comparison of procedures for obtaining informed consent in clinical trials of treatment for cancer. Br Med J 293:1065–1068

Sorrell JM (1991): Effects of writing/speaking on comprehension of information for informed consent. West J Nursing Res 13:110–122

Soskis DA (1978): Schizophrenic and medical inpatients as informed drug consumers. Arch Gen Psychiat 35:645–647

Stanley B, Sieber JE, Melton GB (1987): Empirical studies of ethical issues in research. Am Psychol 42:735–741

Stanley B, Stanley M, Lautin A, Kane J, Schwartz N (1981): Preliminary findings on psychiatric patients as research subjects: A population at risk? Am J Psychiat 38:669–671

Stanley BM, Walters DJ, Maddern GJ (1998): Informed consent: How much information is enough? Aust NZ J Surg 68:788–791

Sugarman J, McCrory DC, Hubal RC (1998): Getting meaningful informed consent from older adults: A structured literature review of empirical research. J Am Geriatr Soc 46:517–524

Sugarman J, McCrory DC, Powell D, Krasny A, Adams B, Ball E, Cassell C (1999): Empirical research on informed consent: An annotated bibliography. Hastings Cent Rep Jan–Feb:S1–S42

Taub H (1986): Comprehension of informed consent for research: Issues and directions for future study. IRB: Rev Human Subjects Res 12:7–10

Taub HA, Baker MT (1983): The effect of repeated testing upon comprehension of informed consent materials by elderly volunteers. Exp Aging Res 9:135–138

Taub HA, Baker MT (1984): A re-evaluation of informed consent in the elderly: A method for improving comprehension through direct testing. Clin Res 32:17–21

Taub HA, Baker MT, Kline GE, Sturr JF (1987): Comprehension of informed consent information by young–old through old–old volunteers. Exp Aging Res 13:173–178

Taub HA, Baker MT, Sturr JF (1986): Informed consent for research: Effects of readability, patient age, and education. J Am Geriatr Soc 34:601–606

Taub HA, Kline GE, Baker MT (1981): The elderly and informed consent: Effects of vocabulary level and corrected feedback. Exp Aging Res 7:137–146

Tindall B, Forde S, Ross MW, Goldstein D, Barker S. Cooper DA (1994): Effects of two formats of informed consent on knowledge amongst persons with advanced HIV disease in a clinical trial of didanosine. Patient Educat Counsel 24:261–266

Tymchuk AJ, Ouslander JG (1991): Informed consent: Does position of information have an effect upon what elderly people in long-term care remember? Educat Gerontol 17:11–19

Tymchuk AJ, Ouslander JG, Rahbar B, Fitten J (1988): Medical decision making among elderly people in long-term care. Gerontologist 28 Suppl:59–63

Verheggen FWSM. van Wijmen FCB (1996): Informed consent in clinical trials. Health Policy 36:131–153

Wadey V, Frank C (1997): The effectiveness of patient verbalization on informed consent. CJS 40:124–128

Weston J, Hannah M, Downes J (1997): Evaluating the benefits of a patient information video during the informed consent process. Patient Educat Counsel 30:239–245

Westreich L, Levine S, Ginsburg P, Wilets I (1995): Patient knowledge about electroconvulsive therapy: Effect of an informational video. Convuls Therap 11:32–37

White CS, Mason AC, Feehan M, Templeton PA (1995): Informed consent for percutaneous lung biopsy: Comparison of two consent protocols based on patient recall after the procedure. AJR 165:1139–1142

Wirshing DA, Wirshing WC, Marder SR, Liberman RP, Mintz J (1998): Informed consent: Assessment of comprehension. Am J Psychiat 155:1508–1511

Young DR, Hooker DT, Freeberg FE (1990): Informed consent documents: Increasing comprehension by reducing reading level. IRB: Rev Human Subj Res 12:1–5